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Parallaxim nullam sensibilem, et si pluries intenterim, deprehendere potui; proindeque maxima ejus distantia à terra credenda est.

Hactenus Illustrissimus Dominus *Franciscus Bianchini* in Mathematicis Scientiis apprimè eruditus, & in observando, quoad noverim, accuratissimus. Ejus observatio à nostra, mea scilicet, ac Prioris Dominici *Capassi* vix in uno aut altero minuto quoad latitudinem discrepavit, cæterū omnino conformis. Quapropter nec illam hic arbitror apponendam.

IV. *Observations about Wasps, and the Difference of their Sexes. By the Reverend Mr. Derham, F. R. S. Prebendary of Windsor.*

IN the Beginning of *July* last 1723. having frequent occasion to be on the Top of our *Collegiate Chapel* in *Windsor Castle*, I observed many *Wasps* flying about it, and particularly frequenting a Covering of *Deal Boards*, and the Pieces of *Timber* lying on the *Leads*. I took notice that most of these *Wasps* were of a larger sort than usual, and thought they came thither to gnaw the *Wood*, and to carry it away in *Mouthfuls* to build their *Nests*; the *Artifice* of which I have taken notice of in my *Phys. Theol.* particularly *B. 4. cb. 11. note 21.* and *chap. 13. not. 12.* But having caught some of them, and amongst the rest a large *Queen-Wasp* (which sort of *Wasp*, by the by, never engages in any *Labours* of the *Colony*) I began to be more strict in my *Observations*; and on *July 6.* I observed a Cluster of only three *Wasps* closely embracing each other; one of which was a large *Female*

male Wasp, the other two of a lesser fort. This more excited my Curiosity. And soon after, I found 8 or 10 *Wasps* closely hanging together, and divers other such like Parcels. In the midst of all which was constantly a *Queen-Wasp*, and only one; the rest being always of a different Sort from either the Queen or the common Wasps; which gave me a Suspicion of their being *Male* and *Female*. And therefore examining another Company of them with greater Strictness, I found the *Queen-Wasp*, in *coitu*, with one of the other Wasps, so closely joined Tail to Tail, that it was some Time before they were parted.

After this I caught all the Wasps I could, on the top of our Chapel, but could not see one of the *common labouring Wasps* among them; but all were for the most part *Male Wasps*, with now and then a *Queen*, or *Female*, among them, and she generally in *coitu*.

And now from this History of my Observation, it appears, That there are three sorts of *Wasps*; The *Queens*, or *Females*; the *Kings*, or *Males*; and the *common Labouring-Wasps*; each of them very distinct.

The *Queen*, or *Female-Wasp* (by many called the *King-Wasp*) is much longer in the Body, and larger than any other Wasp.

The *Male Wasps* are lesser than the *Queens*, but as much longer and larger than the *common Wasps*, as the *Queen* is longer and larger than these. These *Males* also have no Stings, which the *Queens* and *common Wasps* all have. And these are those which *Moufet* saith Authors call *Ἄκεντρος*, and take to be *Females*, although he is of another Opinion, imagining all Wasps to have Stings; upon his examining a Wasp's Nest

Nest, at *Ham*, *Anno 1587.* in which he found no Wasps without a Sting. But I wonder how that curious Enquirer missed of these sting-less Male *Wasps*. Surely he was too hasty in his Examination, and not being aware of the difference, he thought the *Males* (which are but few in number to the *labouring Wasps*) were the same and had Stings as well as the rest; or else he made his Enquiry at a Time when perhaps the Males had deserted the Nest, which probably they may do, as the *Male* or *Drone-Bees* are forced to do: or else the Year 1587. (in which *Moufet* made his Observation) might produce fewer *Wasps*, at least fewer *Male Wasps*, than this last Summer of 1723. did, in which I made my Observation; which was observed to have a greater abundance of Wasp-Nests than hath been known in many Years. And in all the Nests that I searched into, I constantly found *Male Wasps*, either many or few, according to the Size of the Nest, and Number of Wasps therein. And the Part of the Nest where these Males are bred, or at least where I found them most to reside, was chiefly the two uppermost Cells, or Partings, between the Combs, but one.

But to return to the Distinction of our *Male Wasps*. Another thing by which they may be known from other Wasps, is their *Antennæ*, or *Horns*; which are longer and larger than either those of the *Queen*, or *common Wasps*; and with them they seem, in running, to feel more than the others do.

But the grand and chief Difference, are the *Parts of Generation* of these *Male Wasps*, quite different from other Wasps. Which I dissected with all Care, and shall give a Description of, as well as I can, without Figures, which I could not get drawn, partly for want of a Designer, and partly from my Removals between *Windsor* and *Upminster*: in which Time the

Parts are so dried up, or eaten with Mites, that they cannot be drawn 'till the Return of Wasp time.

For the Discovery of these Parts, if the *Alvus* be pressed, an *Horny or Shell-like Part* will be thrust out, of a shining black Colour, which consists of two Parts like Shells, somewhat resembling the *Castagnets* used in Dancing ; at the extreme Part of each of which grows an *Hook*, somewhat like those of the Earwig's Tail, but much lesser ; in the Middle, between these Hooks, appear three Parts, the middlemost of which is a stiff brown *Tube*, very curiously made, with the Fore-part like a Spoon or Lad e, and the other End (within the Body) is neatly branched and braced to each Side within the two Shells I spake of. A little above which Branching, is a *pauxinor* or *Swelling*, like that of a Dog's Pizzle, and perhaps serves for the same Use, if this Tube is (as I imagine it is) the *Penis* of the Wasp.

On each Side this *Penis*, lies a stiff Part (in Number two) branched at the Top with somewhat like Hairs, giving them the Resemblance of *Erubes*. At the Bottom of which are two curious black *Cells*, with an *Opening* on one Side like that of the *Concha Veneris*, with small whitish Hairs growing on one Edge thereof. What the Use of these two Brush-like Members may be, I know not, unless it be to strengthen and support, or direct the *Penis in coitu*, or provoke therein.

Behind all these Parts, which I have described, more within the Body lies a long contorted white *Vessel* ; which at first I took to be the real *Penis*, penetrating the *Ladle-like Tube* I spake of. But upon farther Examination, I rather take it to be the *Spermatick Vessel*.

As to the Use of the two little *Hooks* I mention'd at the End of the *Vropygium*, or *Shells*, I take them

to be, to catch hold of the *Female's Podex*, and to direct and assist the Penetration of the *Penis in coitu*.

As for the *Parts of Generation* in the *Queen*, or *Female-Wasps*, nothing was to be seen so remarkable as in the *Male*; but those Parts are very like what we see in the *common Labouring-Wasps*: Indeed, with the most accurate Observations I could make with my Microscopes, I could not perceive any Difference at all. For which Reason I suppose it is that most of the Writers upon *Wasps* and *Bees*, have been very confused and wavering about the Sexes of these two Tribes of Insects. It would be endless to cite the Authors and their Opinions, especially concerning the *Bee-Tribe*. I think *Swammerdam* (a) (who as he was one of the first that rejected Equivocal Generation, so was one of the most judicious Writers of Insects) that his Opinion, I say, is the most just, *viz.* That of *Bees*, there are three Sorts, *viz.* 1. *Rex*, *aut verius Regina*, *siquidem sequioris sexus est*. 2. *Fuci*, *qui Masculi proprie sunt*. 3. *Apes Operariæ*, *quarum Sexum distinguere non possumus*, *cum in iis nec Masculas nec Fæminas partes observemus*: *qua perbellè distinguuntur in Fucis seu Regibus, & Reginis, quæ tralatitio errore Reges solent salutari*. *In Reginis certè invenimus Ovarium apud incomparabilem illum Anatomum Joh. van Horne, &c.*

As for what is related by *Aristotle*, *Pliny*, *Virgil*, or any other ancient Authors, or by our more numerous Moderns, concerning the Production of *Wasps* out of *Horses*, or *Bees* out of *Oxen* or *young Bullocks*; as also of their *Polity*, their *Emperours*, *Kings*, *Dukes*, and *common Subjects*, their exact *discipline and Justice*,

their strict Temperance, and other Virtues, with a great deal more of such like Stuff: This is so very whimsical, that it is not worth while to take any farther Notice of it: But there is a Story seriously told by *Moufet*, (b) that deserves our Observation, viz. That in the Year 1582, being on the highest Ridges of the Cartmel-Hills, (I suppose in Lancashire) he saw among the Rocks two Species of Wasps desperately fighting: That they differed only in Magnitude; that the larger trusted to their Strength; and the lesser to their Numbers, there being six of the lesser engaged against only one of the larger size, and that the Battle was not in the Air, but among the Grass, and lasted for some Hours in the hotest Sun, not being at an end in two or three Hours space. The Cause of this Engagement *Moufet* thinks was, that the great Wasps are wont to rob the lesser of their Honey and Young, or do them some other such like Mischief; and the lesser being very revengeful, and naturally full of Courage, did outbrave even Mars himself in assaulting their Enemy. But this Engagement I take to be such another, as that which I have given the History of, namely one under the Conduct of *Venus*, not of *Mars*.

And as there is no Doubt to be made of its being such, and that the Engagement seen by *Moufet* was on the highest Tops of *Cartmel* (in *summis Cartmeli montium jugis*) as that I saw was on the very Top of our *Chapel*, it may deserve Observation, whether the Wasps ever copulate in lower Places, obvious to Disturbance, and every one's Eye, or only on such Eminencies where they can be more out of Sight, and consequently in greater Safety: And if at any time they should be found in Copulation, they may all

all with Safety be seized with the naked Hand, provided it can be secured against the *Queen-Wasp*, which is the only one in the Company that is provided with a *Sting*.

For a Close of these Observations about the Sexes of Wasps, I shall take Notice of *Moufet's Experiment*, (which I try'd) viz. *If you take a Wasp by the Feet, and suffer her to buzz, that those Wasps, which have no Stings, will fly to her, but not any that have Stings.* Which some, he saith, use as an Argument to prove that some Wasps are *Males*, some *Females*. This Experiment I was minded to try with a *Queen-Wasp*, more especially, not knowing but that *Wasps*, particularly the *Males*, might be as fond of their *Queens*, as the *Bees* are of theirs, who will not forsake them, but will live and die with them. But I did not find it to succeed so among the *Wasps*. For although I put some *Queen-Wasps*, and others also, near the Entrance of some large *Wasp-Nests*, yet I did not see any Flock near them, only now and then one of the common Wasps, for a little while, to see their Fellow confined. But indeed the *Queen-Wasps* which I confined were weak, and did not buzz long; as also the time of Copulation was probably past, it being *August 12.* when I try'd the Experiment.